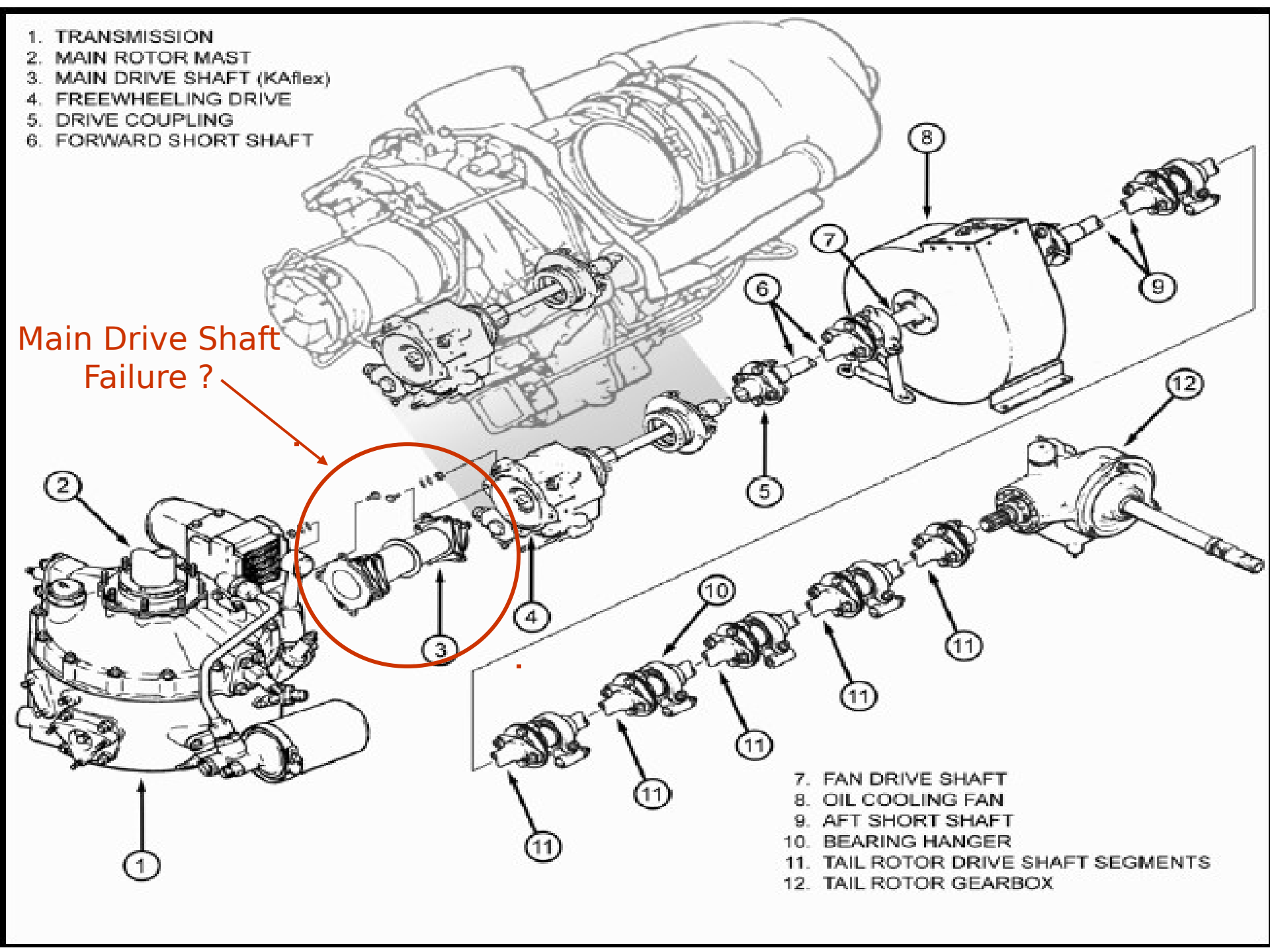
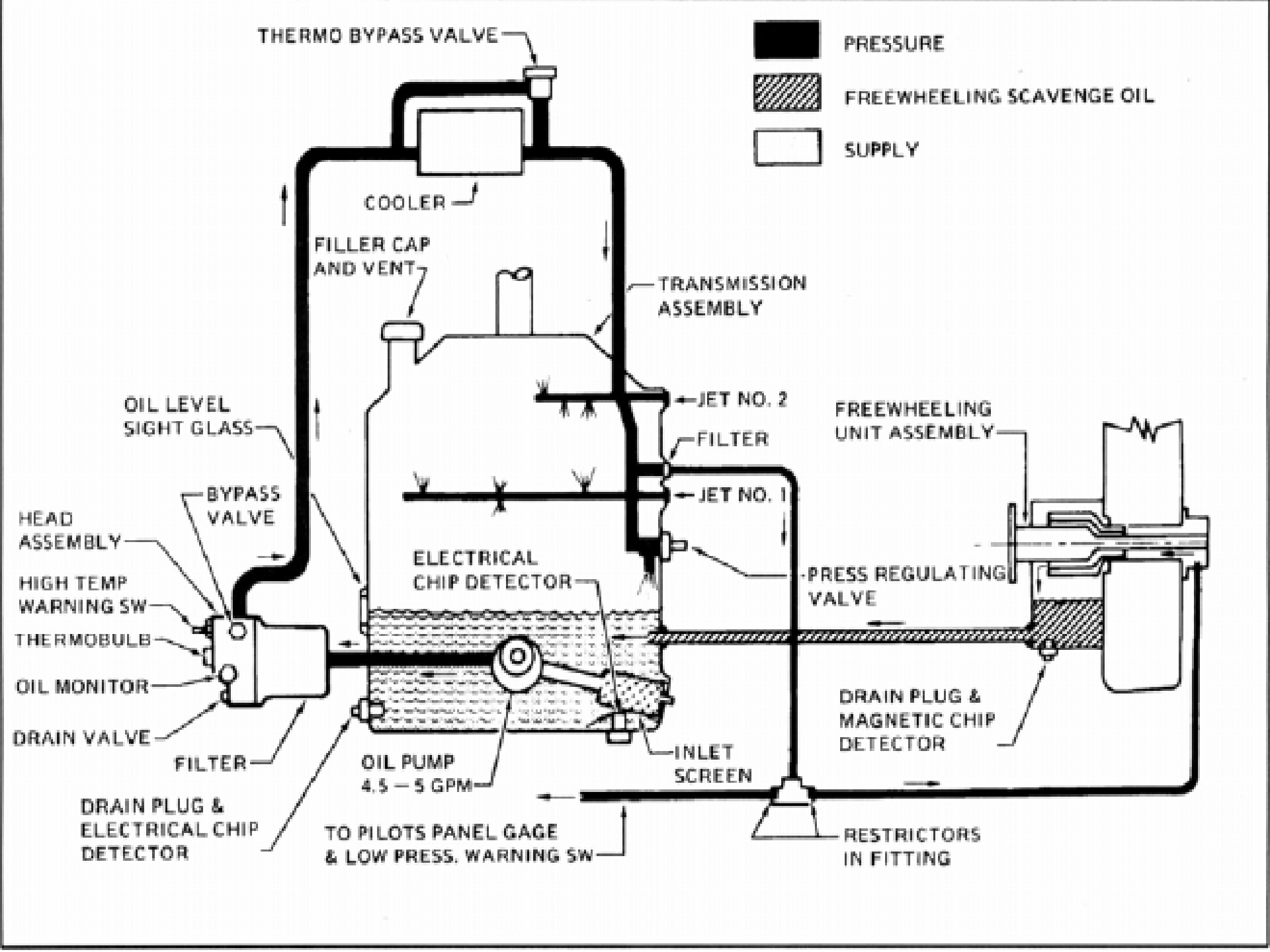
TH-57
Transmission / Hydraulic Review

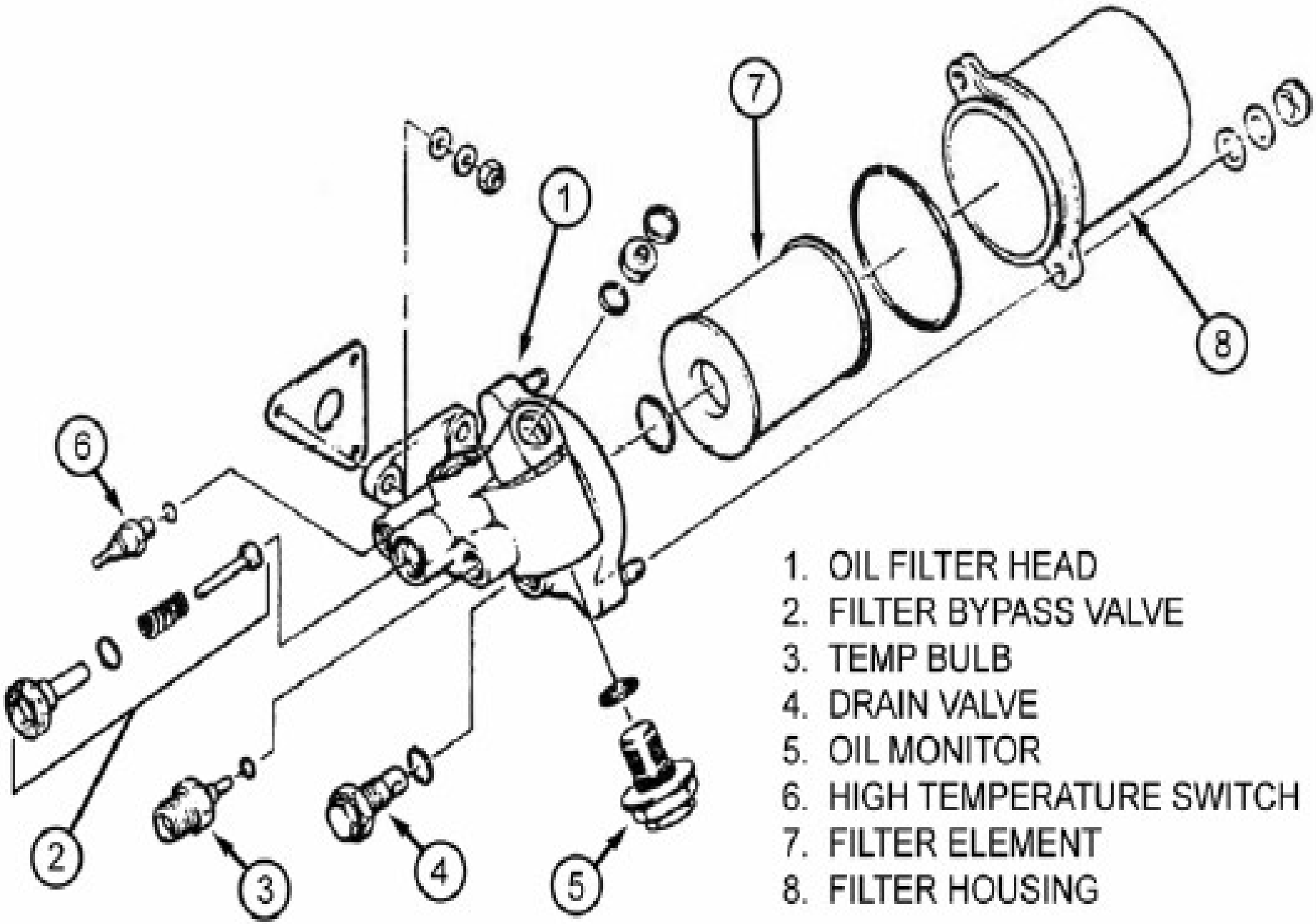
The transmission is placed approximately at the midpoint of the center-of-gravity travel.

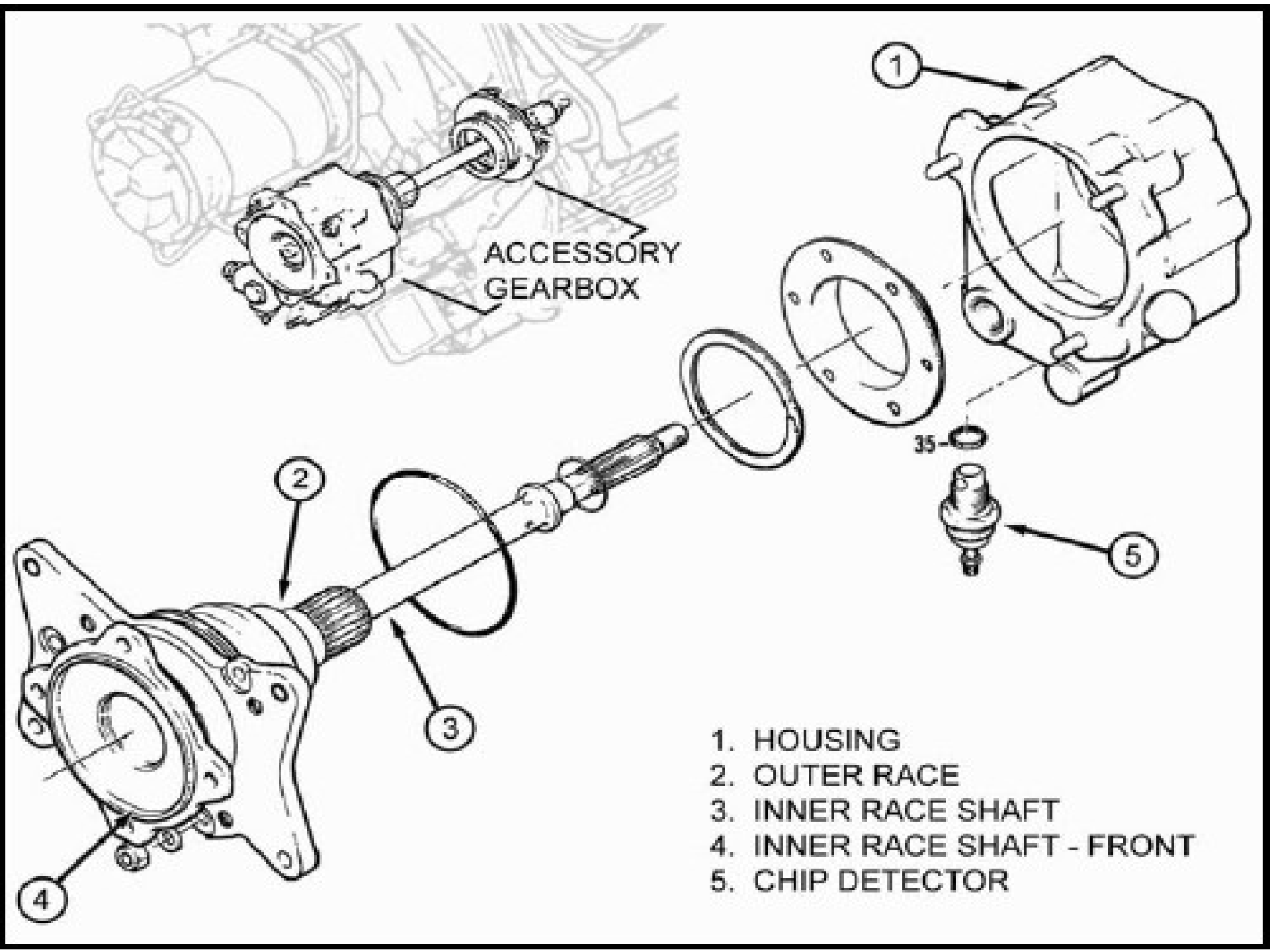
The two-stage planetary transmission system provides a gear reduction of 15.22:1.

The transmission also drives an accessory drive gear that powers the hydraulic pump, transmission oil pump, and the Nr tach-gen.

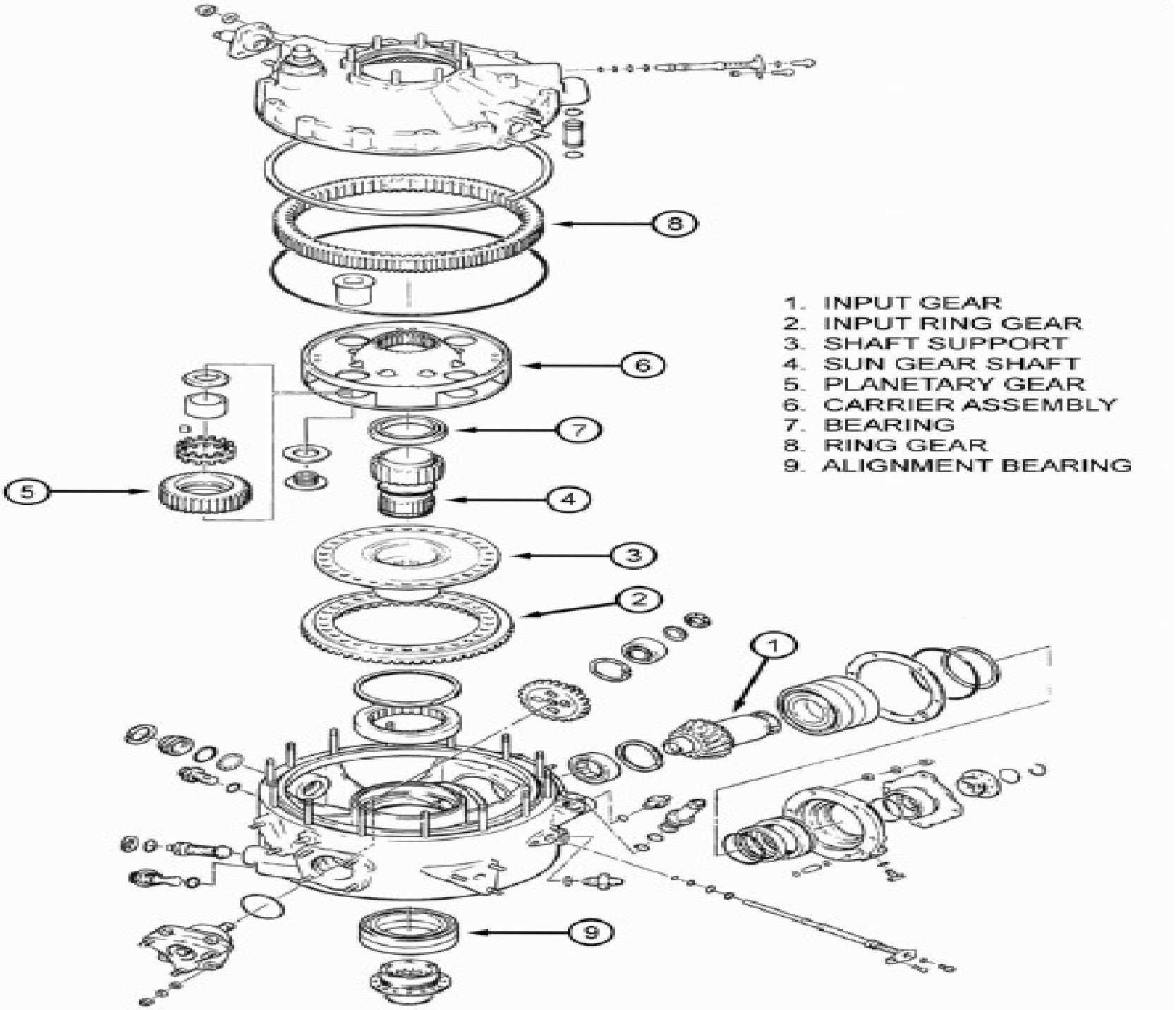

1. TRANSMISSION
2. MAIN ROTOR MAST
3. MAIN DRIVE SHAFT (KAflex)
4. FREEWHEELING DRIVE
5. DRIVE COUPLING
6. FORWARD SHORT SHAFT
Main Drive Shaft Failure ?
7. FAN DRIVE SHAFT
8. OIL COOLING FAN
9. AFT SHORT SHAFT
10. BEARING HANGER
11. TAIL ROTOR DRIVE SHAFT SEGMENTS
12. TAIL ROTOR GEARBOX

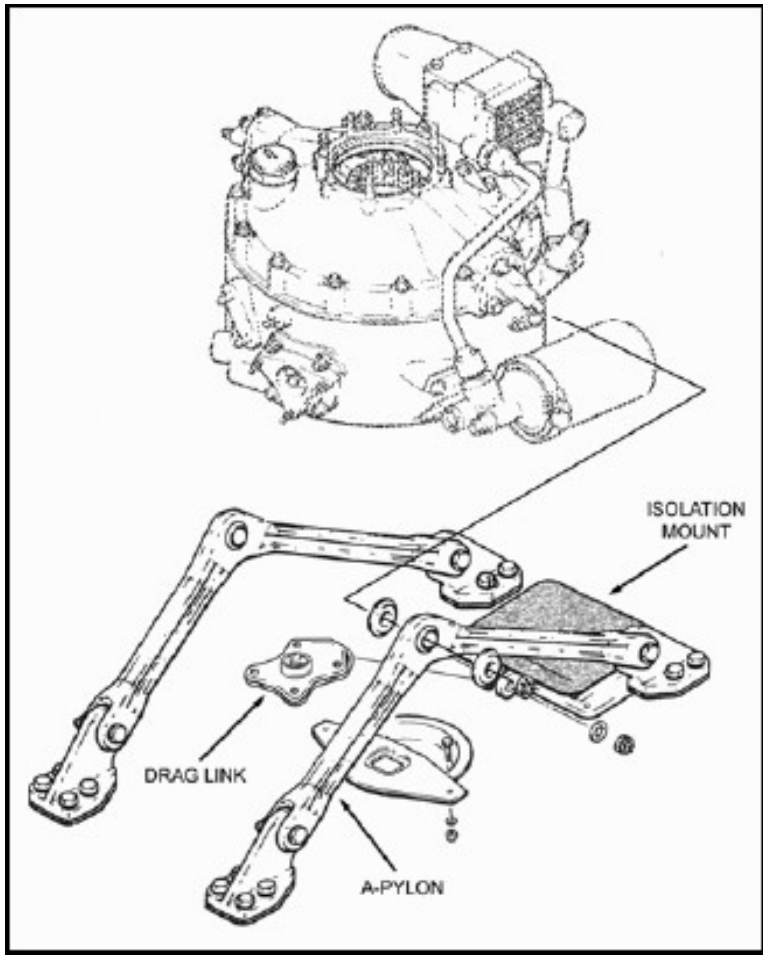

THERMO BYPASS VALVE
PRESSURE
FREEWHEELING SCAVENGE OIL
SUPPLY
COOLER
FILLER CAP AND VENT
TRANSMISSION ASSEMBLY
OIL LEVEL SIGHT GLASS
JET NO. 2
FILTER
FREEWHEELING UNIT ASSEMBLY
BYPASS VALVE
JET NO. 1
HEAD ASSEMBLY
ELECTRICAL CHIP DETECTOR
PRESS REGULATING VALVE
HIGH TEMP WARNING SW
THERMOBULB
OIL MONITOR
DRAIN PLUG & MAGNETIC CHIP DETECTOR
DRAIN VALVE
FILTER
OIL PUMP 4.5 – 5 GPM
INLET SCREEN
DRAIN PLUG & ELECTRICAL CHIP DETECTOR
TO PILOTS PANEL GAGE & LOW PRESS. WARNING SW
RESTRICTORS IN FITTING


1. OIL FILTER HEAD
2. FILTER BYPASS VALVE
3. TEMP BULB
4. DRAIN VALVE
5. OIL MONITOR
6. HIGH TEMPERATURE SWITCH
7. FILTER ELEMENT
8. FILTER HOUSING



1. HOUSING
2. OUTER RACE
3. INNER RACE SHAFT
4. INNER RACE SHAFT - FRONT
5. CHIP DETECTOR


1. INPUT GEAR
2. INPUT RING GEAR
3. SHAFT SUPPORT
4. SUN GEAR SHAFT
5. PLANETARY GEAR
6. CARRIER ASSEMBLY
7. BEARING
8. RING GEAR
9. ALIGNMENT BEARING


ISOLATION
MOUNT
DRAG LINK
A-PYLON

Note

During cold-weather operations, temporary conditions of 155 psi maximum engine oil pressure and/or 170 psi maximum transmission oil pressure are allowable following an engine start.

NATOPS

TRANS CHIP/CLEAR CHIP Condition	Metal particles on transmission chip detector or free wheeling unit.	Instruments — Check transmission instruments for secondary indications of impending failure. If these indications exist, execute Imminent Transmission Failure procedures. If no secondary indications exist, proceed as follows: First chip light — Press CLEAR CHIP; if TRANS CHIP light goes out, note the time and continue flight. If TRANS CHIP remains illuminated, land as soon as possible. Second chip light — If within 30 minutes of the first, land as soon as possible. If more than 30 minutes have elapsed since the first light, press CLEAR CHIP and proceed as with the first light. Any subsequent chip light — If within 50 flight hours of the first, land as soon as possible and make no attempt to clear chip. All chip lights shall be documented on a VIDS/MAF.

Flight Profile ?

[redacted]

14.29 IMMINENT TRANSMISSION FAILURE

If abnormal transmission temperature or pressure indications are accompanied by the illumination of the TRANS CHIP light or abnormal sound from the transmission area:

+1. Land immediately.

WARNING

Do not autorotate; minimize power changes.

+2. Lock harness.

TRANS OIL PRESS / OIL TEMP CAUTION LIGHTS

PANEL WORDING	CONDITION	CORRECTIVE ACTION
TRANS OIL PRESS	Transmission oil pressure at or below 30±2 psi.	Land as soon as possible. **Note** Check the transmission oil pressure with the twist grip full open. Illumination of the TRANS OIL PRESS caution light is common, while the twist grip is at flight idle, after power off maneuvers; However, the gauge should indicate positive transmission oil pressure.
TRANS OIL TEMP	Transmission oil temperature above 110 °C.	Land as soon as possible.

14.28.3 Engine or Transmission Oil Pressures

On ground:

The engine shall be shut down if transmission oil pressure exceeds 70 psi or engine oil pressure exceeds 150 psi.

Airborne:

If either gauge fluctuates erratically, engine oil pressure does not indicate within normal range, or transmission oil pressure is not within 30 to 70 psi:

+1. Land as soon as possible.

WARNING

With suspected transmission malfunctions, the pilot should make an approach with minimum power change to minimize changes to transmission torque.

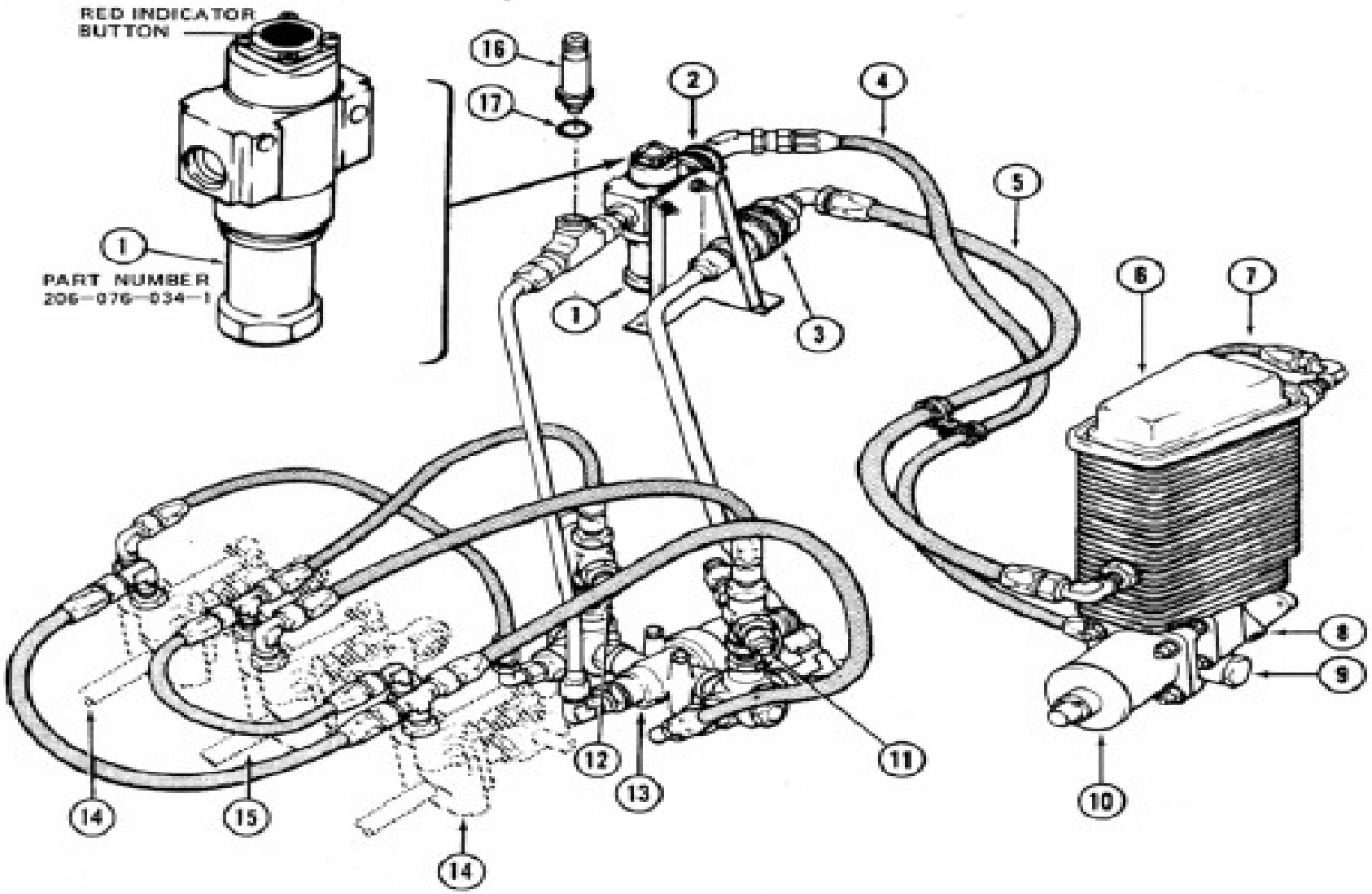
Note

- Check the transmission oil pressure with the twist grip full open. Illumination of the TRANS OIL PRESS caution light is common, while the twist grip is at flight idle, after power off maneuvers; however, the gauge should indicate positive transmission oil pressure.
- There is no detrimental effect to the transmission system with oil pressure between 50 to 70 psi with transmission temperature within limits. Pressure indications between 50 to 70 psi shall be documented on a MAF upon completion of flight.

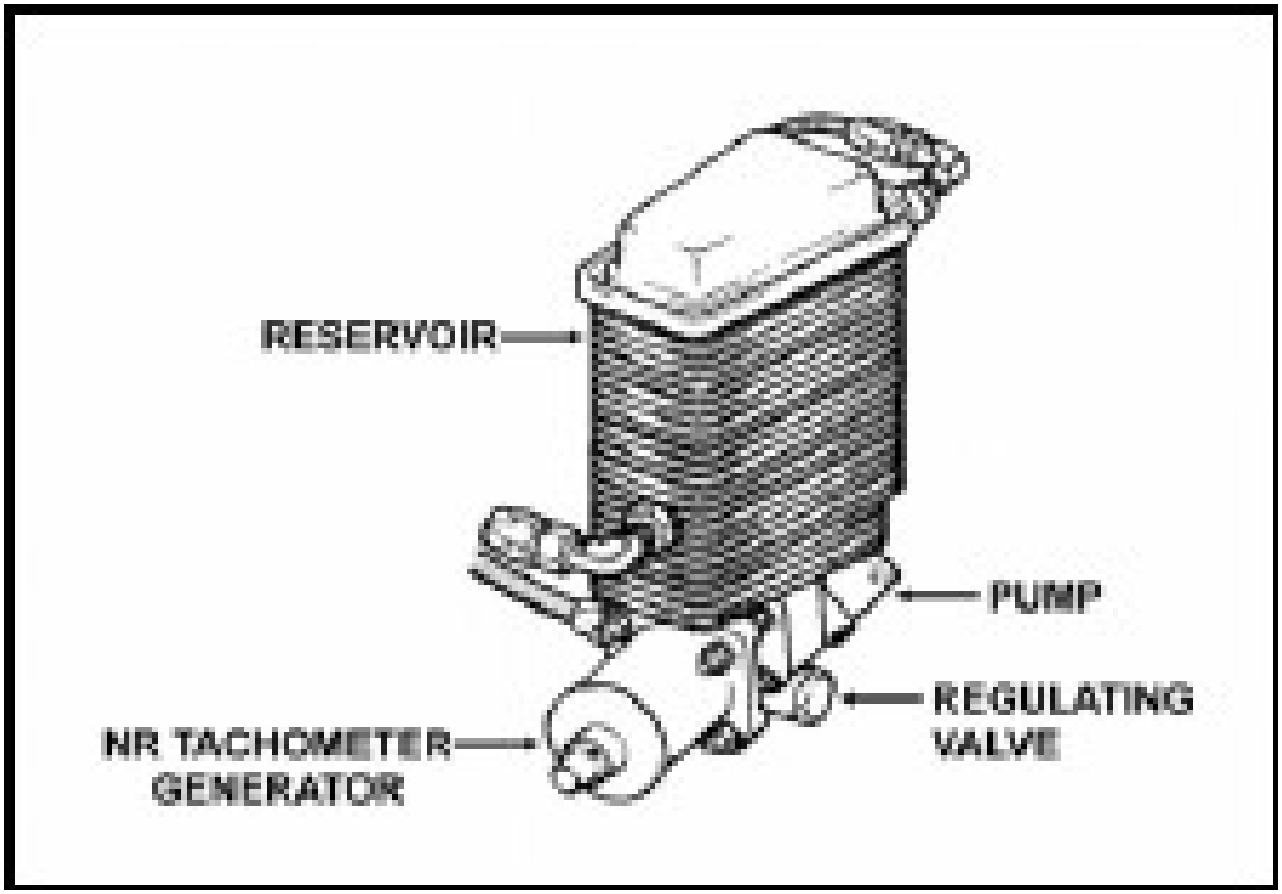
HYDRAULIC SYSTEM

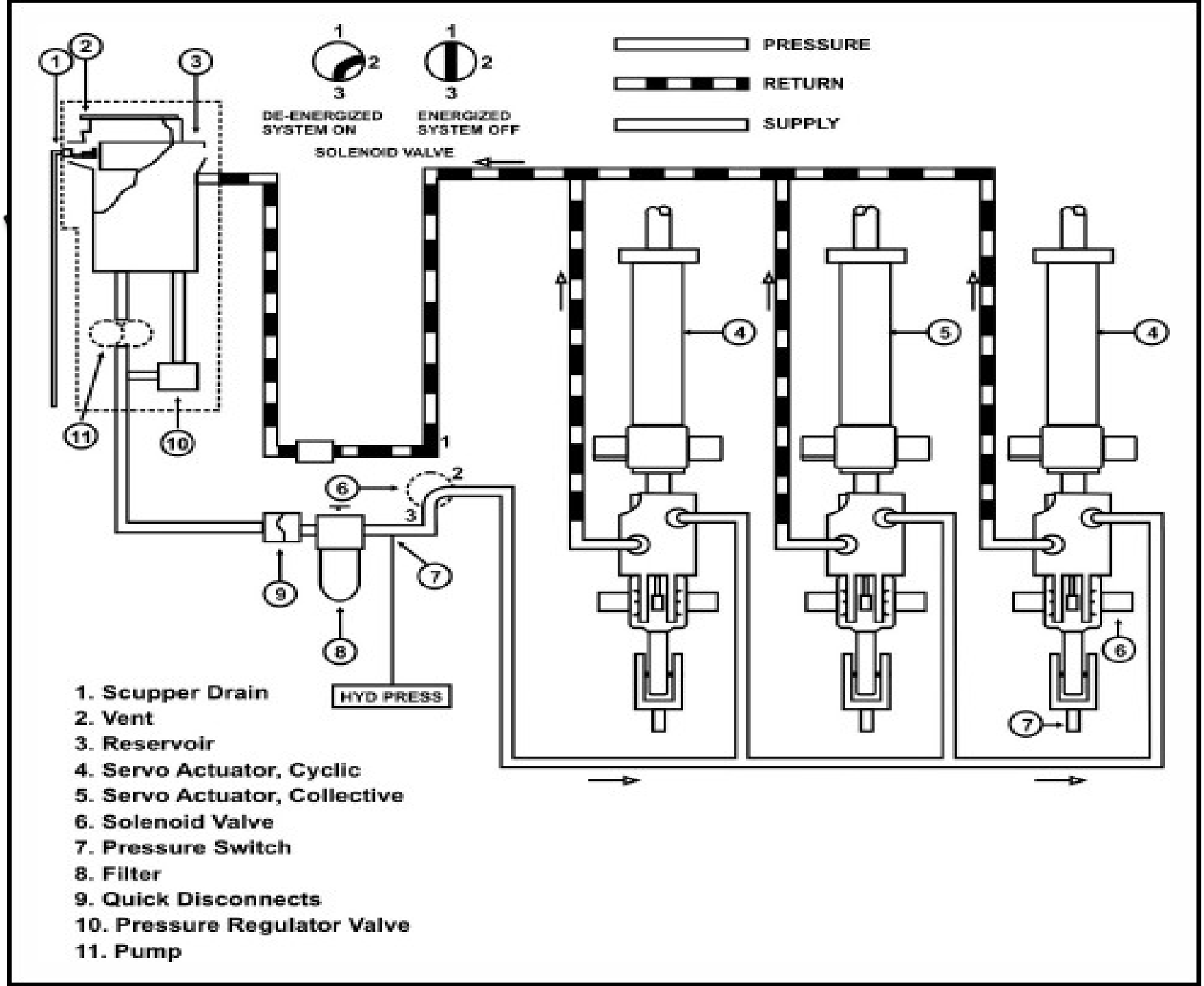
Hydraulic fluid is gravity fed from the reservoir to the pump assembly, which pressurizes the fluid and sends it through the pressure regulator valve. This valve regulates system pressure to approximately 600 +/- 50 psi.

The hydraulic pressure switch, located downstream from the filter, continually monitors system pressure and will close if the pressure falls below 300 psi. A hydraulic pressure light illuminates when the switch closes and goes out when the pressure rises above 400 psi.



1. Filter
2. Quick-disconnect socket (pressure)
3. Quick-disconnect socket (return)
4. Hose (pressure)
5. Hose (return)
6. Pump and reservoir
7. Scupper drain line
8. Vent — (pump seepage drain)
9. Pressure regulator valve
10. Tachometer generator
11. Plug
12. Plug
13. Solenoid valve
14. Servo actuator (cyclic)
15. Servo actuator (collective)
16. Switch (low pressure)
17. Packing


RESERVOIR
PUMP
REGULATING VALVE
NR TACHOMETER GENERATOR


1
2
3
DE-ENERGIZED
SYSTEM ON
ENERGIZED
SYSTEM OFF
SOLENOID VALVE
PRESSURE
RETURN
SUPPLY
HYD PRESS
1. Scupper Drain
2. Vent
3. Reservoir
4. Servo Actuator, Cyclic
5. Servo Actuator, Collective
6. Solenoid Valve
7. Pressure Switch
8. Filter
9. Quick Disconnects
10. Pressure Regulator Valve
11. Pump

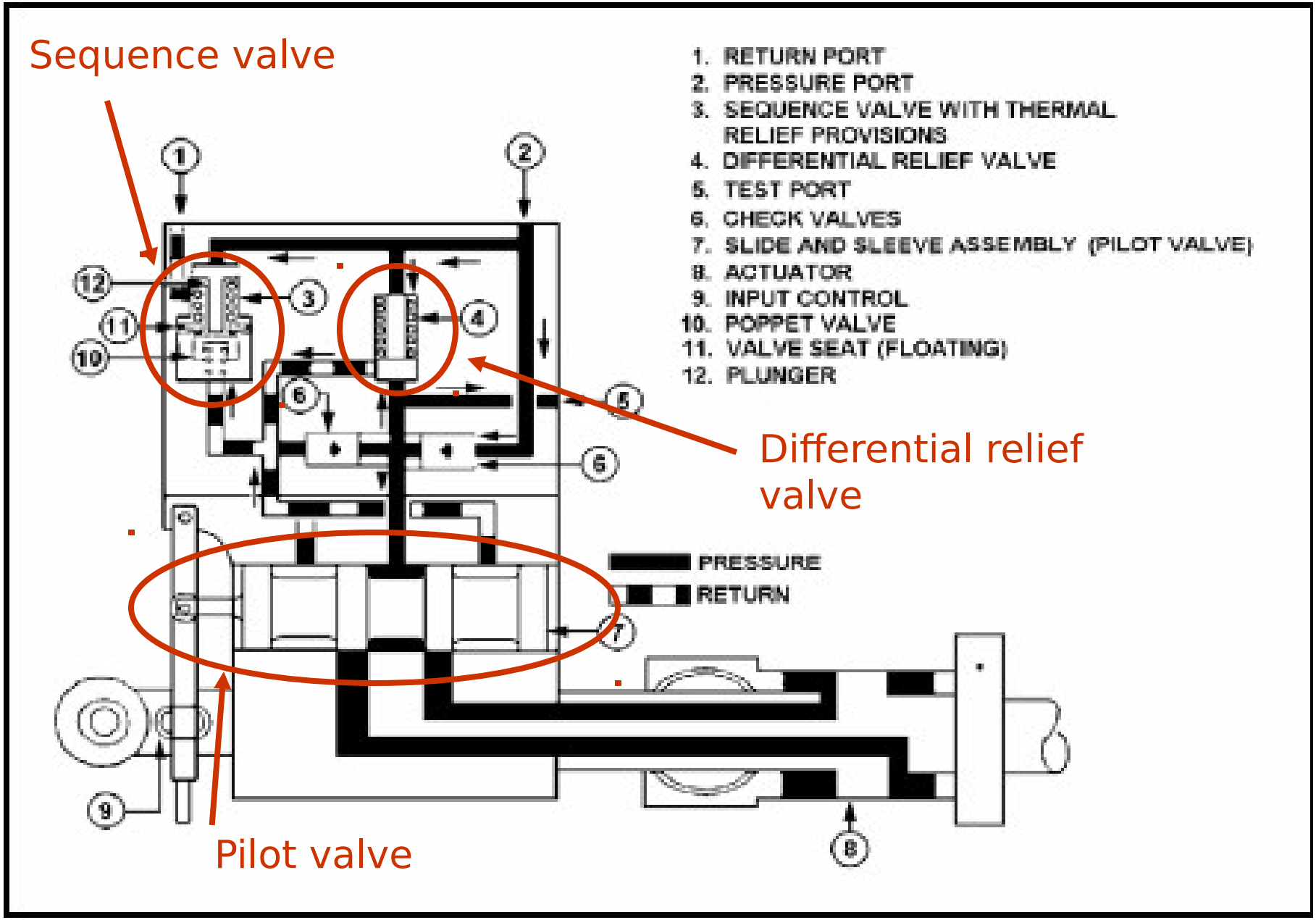


Figure 6-7 Servo Actuator Diagram

Sequence Valve

- Hydraulic pressure on the sequence valve pushes down on the poppet valve and spring, thereby opening a return port for fluid to return to the reservoir.
- If pressure is lost, the sequence valve closes, trapping fluid in the servo which will continue to dampen main rotor feedback (vibrations).

Differential Relief Valve

- The function of the differential relief valve is to cause fluid to be routed to the return line if back pressure exceeds system pressure.
- Heavy main rotor loads are one possible source of excessive back pressure

Pilot Valve

- The pilot valve is mechanically connected to the flight controls and receives input from movement of the controls. This causes the pilot valve to move and allow fluid under 600 psi pressure to enter the actuator, which then moves the flight controls. When the flight controls reach the desired position, the pilot valve centers and fluid flow to the actuator is stopped.

Note

Odd or unusual stick forces will be felt in a boost-off situation. Because of excessive forces required for control manipulation, a shallow approach with a sliding landing is recommended.

14.22.1 Hydraulic System Failure

Indications:

HYDRAULIC PRESSURE light.

Increased force required for control movement.

Feedback in control.

Procedures:

+1. Airspeed — Adjust (to obtain most comfortable control movement level).

+2. HYDRAULIC BOOST switch — Check ON.

+3. HYD BOOST circuit breaker — Out.

If system is restored:

4. Land as soon as practical.

If system is not restored:

5. HYD BOOST circuit breaker — In.

6. HYDRAULIC BOOST switch — OFF.

(C) 7. FORCE TRIM (FT) — On.

(C) 8. AFCS STAB — ON.

(C) 9. AFCS ALT — OFF.

10. Land as soon as practical.

14.22.2 Hydraulic Power Cylinder Malfunction

Indications:

Cyclic/collective control displaces to abnormal position.

Pilot control of cyclic/collective is difficult or impossible.

Procedures:

*1. HYDRAULIC BOOST switch — OFF.

WARNING

*2. Helicopter — Regain control.

Adjust airspeed as desired to obtain most comfortable control movement level.

*3. Land as soon as possible.

WARNING